

Claims

1. A method for data recovery from a time-continuous
signal compliant to one or more digital signal formats
each having a specific channel bit clock and a sync
pattern occurring in regular intervals, the method
being **characterised** by the following steps:
 - sampling (21, 301, 41) the time-continuous signal at
a frequency at least as high as the maximum of all
frequencies of the channel bit clocks of the digital
signal formats;
 - analysing (25, 310, 45) the sampled signal to locate
occurrences of one or more of the sync patterns,
thereby making available, as an analysis information,
where in the sampled signal which ones of the sync
patterns are located;
 - calculating from the analysis information a distance
information about the distance between consecutive
locations of sync patterns;
 - converting (23, 26, 303, 304, 306, 309, 311, 43, 46)
the sampled signal into a converted signal which
represents the data at the channel bit clock.
2. The method of Claim 1, where the step of converting
includes the following steps:
 - calculating (26, 311, 46) from the analysis
information and/or the distance information a channel
bit rate and/or the channel bit clock, and
 - converting (23, 303, 306, 309, 43) the sampled signal
to the sampling rate defined by the calculated
channel bit rate or bit clock.
3. The method of Claim 1 or 2, additionally including the
following step:

- after analysing the sampled signal, providing for further use as frame alignment information the locations where sync patterns have been located.

- 5 4. The method of Claim 2, additionally including the following step:
- after locating a sync pattern occurrence, decoding (47) from a second signal an address information contained therein,

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5. The method of Claim 1, additionally including the following step:
- recognising, from the analysis information and the distance information, the signal format to which the
- 15 signal complies.

6. The method of any of Claims 1 to 5, where the step of analysing (25, 310, 45) employs a cross-correlation.

- 20 7. The method of Claim 5, additionally including any one or more of the following steps:
- analysing (25, 310, 45), after recognizing the format to which the signal complies, with an algorithm that depends on the recognized format, the sampled signal
- 25 to locate occurrences of one or more predefined sync patterns, thereby making available analysis information about where in the sampled signal which ones of the sync patterns are located;
- calculating, with an algorithm that depends on the
- 30 recognized format, from the analysis information a distance information about the distance between consecutive locations of sync patterns;
- calculating (26, 311, 46), with an algorithm that depends on the recognized format, from the analysis

information and/or the distance information a channel bit rate and/or the channel bit clock;

- converting (23, 303, 306, 309, 43), with an algorithm that depends on the recognized format, the sampled signal to the sampling rate defined by the calculated channel bit rate or bit clock.

8. The method of Claim 4, where the sampled signal or a sample rate converted sampled signal is used as the second signal.
9. The method of Claim 4, where a maximum likelihood decoder is applied for the decoding (47) step.
10. The method of Claim 5, where the analysing (25, 310, 45) step involves the following sub-steps
 - a) setting as a current sync pattern a first sync pattern from a finite set of different sync patterns,
 - b) analysing the sampled signal to find positions of the current sync pattern,
 - c) if no positions are being found and the last sync pattern in the set has not been reached, setting as the current sync pattern the next sync pattern from the set and looping back to sub-step b).
11. The method of Claim 10, where the analysing sub-step b) involves the following sub-steps
 - b1) setting as a current sync pattern version a first stretched version from a finite set of differently stretched versions of the current sync pattern,
 - b2) analysing the sampled signal to find positions of the current sync pattern version,
 - b3) if no positions are being found and the last current sync pattern version has not been reached, setting as the current sync pattern version the next

sync pattern version from the set and looping back to sub-step b2).

12. An apparatus for recovering a channel bit clock from a time-continuous signal compliant to one or more digital signal formats each having a specific channel bit clock and a specific framing structure including a sync pattern occurring in regular intervals, the apparatus including
- sampling means (21, 301, 41) which generate a sampled signal from the time-continuous signal,
 - analogue to digital conversion means (21, 301, 41) connected to the sampling means (21, 301, 41) and
 - sample rate conversion means (23, 303, 306, 309, 43);
- the apparatus **characterised** by
- an analyser (25, 310, 45) adapted to analyse the sampled signal to locate occurrences of one or more of the sync patterns,
 - a calculator (26, 311, 46) adapted to calculate a channel bit rate and/or the channel bit clock from the locations where sync patterns are located,
- wherein the sample rate conversion means (23, 303, 306, 309, 43) convert its input data to output data obeying an output sample rate equal to the channel bit rate or bit clock as calculated by the calculator.
13. The apparatus of Claim 12, where the sample rate conversion means includes two or more units (302, 303, 305, 306, 308, 309) working in parallel, each consisting of a storage means (302, 305, 308) and an associated interpolation means (303, 306, 309).
14. The apparatus of Claim 12 or 13, additionally including a sync ID decoder (47) triggered by the analyser (45)

having located a sync pattern occurrence, the sync ID decoder (47) decoding the sync IDs from the sample rate converted digitised signal.

- 5 15. The apparatus of Claim 12 or 13, where the analyser (25, 310, 45) includes a sync pattern selector for selecting as current sync pattern one sync pattern from a finite set of different sync patterns and a loop back controller for looping back to an analysing step
10 whenever for a certain current sync pattern no occurrences have been found.
16. The method of any of Claims 1 to 11 or the apparatus of any of Claims 12 to 15, where the time-continuous
15 signal is a readout signal from a digital storage medium.
17. The method of any of Claims 1 to 11 or the apparatus of any of Claims 12 to 15, where the time-continuous
20 signal is a received signal from a digital transmission.